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A NOTE ON PATTERNS OF MARKET INTERVENTION IN AGRARIAN AFRICA

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ABSTRACT

This paper summarizes recent interpretations of government behavior toward agriculture in Africa and seeks to assess their credibility through empirical testing.

With respect to food crops, governments are seen as intervening on behalf of urban interests. For cash crops, they are viewed as manipulating prices in order to tax, both so as to collect public revenues and so as to redistribute purchasing power to the consumers of imports. Ideological preferences also influence government behavior.

A Note on Patterns of Market Intervention in Agrarian Africa

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It is a well-known fact that governments in the less developed nations intervene in agricultural markets in efforts to lower commodity prices. Schultz notes and condemns this "distortion," contending that in the absence of price disincentives farmers in the developing nations could "turn sand into gold."¹ Summarizing research conducted by the International Bank for Reconstruction and Development, Malcolm Bale and Ernst Lutz estimate that policy induced price distortions in Argentina, Egypt, Pakistan and Thailand lowered agricultural output by tens of millions of tons and drove hundreds of thousands of persons from agricultural employment (table 1).² The impact of price policies in less developed countries is such that Willis Peterson concludes: "On the basis of [my] evidence, one strongly suspects that had farmers in the L.D.C.'s enjoyed the level of prices that prevailed in the developing nations, or even in the world market, there would be no such thing as a world food shortage."³

The question naturally arises: Why do governments behave this way? I have examined this question in Africa.⁴ In this paper, I elaborate upon some answers to it and offer some modest statistical

Table 1: Real Effects of Price Distortions, 1976

Country	Estimated Change in Production		Estimated Change in Consumption		Estimated Change in Agricultural Employment			
					(average coefficients)		(marginal coefficients)	
	low	high	low	high	low	high	low	high
	-----'000 metric tons-----				-----full time workers-----			
ARGENTINA								
Wheat	-2,343	-7,028	329	988	-19,525	-58,567	-39,050	-117,133
Rice	-20	-59	5	16	-520	-1,534	-1,040	-3,068
Maize	-1,341	-4,083	318	953	-24,585	-74,855	-49,170	149,710
Beef	-273	-820	187	562	-1,638	-4,920	-3,276	-9,840
EGYPT								
Wheat	-255	-786	898	2,748	-18,700	-133,096	-43,180	-133,096
Rice	-1,068	-3,204	466	1,435	-128,160	-384,480	-185,120	-555,360
Maize	-450	-506	388	1,197	-36,000	-40,480	-72,000	-80,960
PAKISTAN								
Wheat	-417	-1,299	577	1,671	-34,333	-106,951	-74,087	-230,789
Rice	-465	-1,394	376	1,128	-44,950	-134,753	-54,250	-162,633
Maize	-5	-15	8	25	-500	-1,500	-800	-2,400
THAILAND								
Rice	-371	-1,165	139	323	-49,467	-155,333	-71,727	-225,233
Maize	5	16	0	-1	400	1,280	800	2,560
Sugar	55	166	-37	-112	-6,197	18,703	9,295	28,054

Source: Malcolm D. Bale and Ernst Lutz, Price Distortions and Their Effects: An International Comparison, World Bank Staff Working Paper No. 359 (1979).

tests of these political interpretations.

In the discussion that follows, I treat separately food crops, which are largely grown for domestic consumption, and cash crops, which are largely destined for foreign markets.

The Political Origins of Food Policy

African governments seek low priced food. One way in which they do so is by regulating market transactions.⁵ Many control consumer prices; others regulate the prices at which producers can sell agricultural commodities; and still others maintain an official government monopoly over the purchase and retail of specific food commodities.⁶

What are the sources of government policy toward food crops? Put bluntly, food policy appears to represent a form of political settlement, one designed to bring peaceful relations between African governments and their urban constituents. And it is a settlement in which the costs tend to be born by the farmers.

The urban origins of African food policies are perhaps most clearly seen in Nigeria. If one looks at the historical origins of government food policy in Nigeria, one is drawn to the recommendations of a series of government commissions -- the Udoji Commission, the Adebo Commission, and the Anti-Inflation Task Forces, for example⁷ -- which were impaneled to investigate sources of labor unrest and to resolve major labor stoppages. The fundamental issue driving urban unrest, they noted, was concern with the real value of urban incomes and the erosion of purchasing power because of inflation. While

recommending higher wages, these commissions also noted that pay increases represented only a short-run solution; in the words of the Adebo Commission, "It was clear to us that, unless certain recommended steps were taken and actively pursued, a pay award would have little or no meaning." "Hence," the Commission noted, "our extraordinary preoccupation with the causes of the cost of living situation."⁸ As part of its efforts to confront the cause of the rising cost of living, the Commission went on to recommend a number of basic measures, among them a number of proposals "to improve the food supply situation."⁹ The origins of many elements of Nigeria's agricultural program lie in the recommendations of these reports.

Urban consumers in Africa constitute a vigilant and potent pressure group demanding low priced food. Because they are poor, they spend much of their income on food; most studies suggest that urban consumers in Africa spend between 50 and 60 percent of their incomes on food.¹⁰ In addition, when personal incomes rise, the demand for many food crops rises even faster; this is particularly the case for milk, sugar, rice and wheat.¹¹ Changes in the price of food therefore have a major impact on the economic well-being of urban dwellers in Africa, and this relationship is strengthening in some cases as development proceeds. Urban dwellers therefore pay close attention to the issue of food prices.

Urban consumers are potent because they are geographically concentrated and strategically located. Because of their geographic concentration, they can quickly be organized; and because they control

such basic facilities as transport, communications, and public services, they can impose deprivations on others. They are therefore influential. Urban unrest forms an important prelude to changes of governments in Africa, and the cost and availability of food supplies is a significant factor promoting urban disaffection.¹²

It should be noted that it is not only the worker who cares. It is also the employer. Employers care about food prices because food is a wages good; with higher food prices, wages must rise and, all else being equal, profits fall. Governments care about food prices not only because they are employers in their own right but also because as owners of industries and promoters of industrial development programs they seek to protect industrial profits. Indicative of the significance of these interests is that the unit that sets agricultural prices often resides not in the Ministry of Agriculture but in the Ministry of Finance or Commerce.

When urban unrest begins among food consumers, then, political discontent often rapidly spreads to upper echelons of the polity: it comes to include those whose incomes come from profits, not wages, and those in charge of major bureaucracies. Political regimes that are unable to supply low cost food are seen as dangerously incompetent and as failing to protect the interests of key elements of the social order. In alliance with the urban masses, influential elites are likely to shift their political loyalties and to replace those in power. Thus it was that protests over food shortages and rising prices formed a critical prelude to the coup that unseated Busia and

led to the period of political maneuvers and flux that threatened to overthrow the government of Arap Moi.

It is ironic, but true, that among those governments most committed to low cost food are the "radical" governments in Africa. Despite their stress on economic equality, they impose lower prices on the commodity from which the poorest of the poor -- the peasant farmers -- derive their incomes. A major reason for their behavior is that they are deeply committed to rapid industrialization; moreover, they are deeply committed to higher real wages for urban workers and have strong institutional ties to organized labor.

We can thus understand the demand for low cost food. Its impetus derives from the urban areas. Its origins lie in the fact that food is a major staple and that higher prices for such staples threaten the real value of wages and profits. And it is supported by governments, both out of political necessity and, on the part of more radical ones, out of ideological preference.

To investigate the validity of this political interpretation of the origins of food price policy, I have examined data collected by the United States Department of Agriculture and published in its report entitled Food Policies and Perspectives in Sub-Saharan Africa.¹³ Resource constraints and problems with the data led me to concentrate on two commodities -- rice and maize. While maize is grown and consumed almost everywhere in Africa, rice is much more frequently imported than grown. While analyzing patterns of government intervention in retail markets for both commodities, I have

Table 2

therefore had to confine my attention to the control of retail prices in the case of rice. The results of my analysis are contained in tables 2-4.

The basic hypothesis underlying the interpretation advanced above is that insofar as agricultural commodities are staples of urban consumption, then political pressures will lead to their being subject to price controls. The equations contain a dummy variable which takes on the value of one if the relevant commodity is reported by the USDA to be a staple of urban consumption; otherwise it takes on the value of zero. The hypothesis is supported when the value of the coefficient of this dummy variable is positive and statistically significant. In all three cases, the estimates support the hypothesis (see tables 2-4).

The second hypothesis is that urban unrest is driven by the erosion of the real value of urban incomes brought on by inflation.¹⁴ The relationship between inflation and market intervention is therefore expected to be positive and statistically significant. As seen in tables 2-4, the coefficients tend to be of the predicted sign, although in two instances attaining levels of significance too low to lend persuasive support to this hypothesis.

The interpretation advanced above also leads to the hypothesis that ideological preferences count. In particular, it suggests that the more deeply governments are committed to the promotion of industrial growth and to the protection of the interests of the working class, the more likely governments are to intervene in efforts

Dependent Variable: Probability of Government Regulation of the Retail Price of Maize.

Independent Variable	Maximum Likelihood Estimate of Probit Coefficient	Ratio of M.L.E. to Standard Error	Significance Level(1)	
			Assuming t-Distribution (2)	Assuming Normal Distribution
Government's Ideology				
Marxist-Leninist	0.912	1.435	.10	.08
African socialist	0.532	0.786	—	—
Capitalist	-0.729	-0.988	—	—
Staple of Urban Consumption	1.297	2.411	.025	.01
Inflation	0.107	1.414	.10	.08
Constant	-1.776			

Estimated $R^2 = 0.54$

Proportion Cases Correctly Predicted = 0.757

1. One-tailed test.
2. 30 degrees of freedom.

Table 3

Dependent Variable: Probability of Government Regulation of the Producer Price of Maize.

Independent Variable	Maximum Likelihood Estimate of Probit Coefficient	Ratio of M.L.E. to Standard Error	Significance Level ⁽¹⁾	
			Assuming t-Distribution ⁽²⁾	Assuming Normal Distribution
Government's ideology				
Marxist-Leninist	0.967	1.470	.10	.08
African socialist	0.300	0.421	—	—
Capitalist	-.795	-0.098	—	—
Staple of Urban Consumption	1.780	2.775	.005	.003
Inflation	0.106	1.270	.12	.12
Constant	-1.413			

Estimated $R^2 = 0.61$

Proportion Cases Correctly Predicted = 0.706

1. One-tailed test.

2. 30 degrees of freedom.

to secure low cost food.¹⁵ In a recent book, Crawford Young classifies African governments as Marxist-Leninist, African Socialist, and Capitalist.¹⁶ Constructing dummy variables with the residual category consisting of governments with no discernible ideology, the interpretation suggests:

1. That the coefficients for the first two dummy variables -- those indicating that the governments are Marxist-Leninist or Socialist -- would be positive whereas the coefficient for the third -- that indicating that the government is capitalist -- would be negative.

2. That the magnitude of the coefficients would vary, with that for Marxist-Leninist governments being the largest and that for capitalist governments being the smallest.

3. That all coefficients would be statically significant. These three general predictions translate into 20 specific predictions about the properties of the coefficients to the variables included in these three equations. Of these roughly two-thirds are fulfilled. In two of the three equations, the relative magnitude of the coefficients conforms to my prediction. In eight of nine cases, the signs behave properly. In three or four of the possible nine cases are the coefficients significant, depending upon whether one wants to be extremely generous or merely very generous about the standards of significance employed. It should also be noted that in one case (that of governmental regulation of the retail price of rice) satisfactory results were only achieved when an additional control was introduced

Table 4

Dependent Variable: Probability of Government Regulation of the Retail Price of Rice.

Independent Variable	Maximum Likelihood Estimate of Probit Coefficient	Ratio of M.L.E. to Standard Error	Significance Level(1)	
			Assuming t-Distribution (2)	Assuming Normal Distribution
Government's Ideology				
Marxist-Leninist	1.095	1.266	.12	.12
African socialist	1.445	1.498	.10	.08
Capitalist	0.111	0.153	—	—
Staple of Urban Consumption	2.265	3.576	.005	.001
Inflation	0.113	2.371	.025	.01
Percent Labor Force in Government Service	-0.515	-1.329	.10	.10
Constant	-2.237			

Estimated $R^2 = 0.61$

Proportion Cases Correctly Predicted = 0.838

1. One-tailed test.
2. 30 degrees of freedom.

for the "size of government."

These estimates, it should be noted, are of probit, not regression, coefficients. The reason for employing probit analysis is that the dependent variables take on but two values: either a government does or does not intervene in a market. Because of the limited nature of the dependent variables, estimates of regression coefficients would be biased; probit analysis allows unbiased estimates. While, unlike regression coefficients, probit coefficients are difficult to interpret, nonetheless significance tests can be applied to them. In applying these tests, I have used both the t and normal distributions; the ratio of the maximum likelihood estimate of a probit coefficient to its standard error asymptotically approximates the normal distribution. Moreover, models estimated with probit techniques can be evaluated in terms of the R^2 statistic and in terms of the percent of cases in which the model predicts the correct state of the dependent variables (i.e. in this case, whether the government did or did not intervene in a particular market). The R^2 statistic for these three equations ranges between .54 and .61. The equations correctly predict .76, .71, and .84 of the 38 cases; by chance alone, we could predict .55, .63, and .73 of them correctly.

Cash Crops

African governments also pursue low price policies with respect to export crops: cocoa, coffee, cotton and so forth. Most do so by maintaining public bureaucracies called marketing boards which serve as government sanctioned monopsonies. Using their market power,

maximizing at the expense of revenue collections from the industry or that it used a higher (possibly long-term) estimate of the elasticity of production. Nonetheless, the results are sufficiently impressive to suggest that the model of revenue maximization provides a persuasive first approximation to a model of government behavior.

Scarcity of data render it impossible to replicate Bovet and Unnevehr's analysis in other nations in Africa. Only unsatisfactory substitutes are possible. One is an analysis of the coefficients of nominal protection, which measure the ratio of domestic to world prices. The smaller the coefficient of nominal protection, the further the domestic price lies below the world market price. Such coefficients have been calculated for thirteen nations in Africa by the World Bank.²¹

With so few observations, there is little in fact that can be done with data. Nonetheless, I have been able to test the hypotheses that: (1) the greater the demand for public revenue, i.e. the more activist the government, the lower the level of nominal protection coefficients; and (2) the lower the supply of public revenue from non-agricultural sources, then the higher the level of these coefficients. The rationale underlying both hypotheses is that price-setting behavior by African governments with respect to export crops is driven by the need for public revenues and that the disparity between domestic and international prices for exports provides a measure of agricultural taxation.²²

As an indicator of government activism I have used as an index

the percentage of the national labor force in public employment. As an indicator of alternative sources of tax revenues (and thus of the adequacy of revenue supply) I have noted the existence or nonexistence of commercial petroleum deposits. The results of this "mini-analysis" are present in table 5. As there are no restrictions on the value of the dependent variable, the coefficients in this table are ordinary least squares estimates. The signs of the coefficients are as predicted. The variables included in the equation "explain" nearly two-fifths of the variation in the pricing behavior of the thirteen African governments. Significance levels are low, however. The results generate a sense of encouragement, not conviction.

To push this effort further, I chose an alternative dependent variable: the level of overvaluation of the domestic currency. Relevant data have been compiled by Jansen in her background paper for the 1981 World Bank report²³ and have been supplemented with data taken from Pick's currency yearbook.²⁴ Combining data from these sources allows a 50 percent increase in the number of observations (from 13 to 19).

Overvaluation adversely affects those who earn their incomes in foreign markets. It benefits those who use the domestic currency to import from abroad. Among the foremost of these beneficiaries are the import-substituting industries who, because of overvaluation, are able to import capital equipment more cheaply. In some cases, overvaluation is chosen as a matter of deliberate policy. In other cases, it results from the maintenance of fixed exchange rates in

the boards set low domestic prices for their crops; they then sell the crops abroad at prices prevailing in the world market. The difference between the sale and purchase price is accumulated by the marketing board in the form of trading revenues; in most cases, these revenues simply become the possession of the national treasury. The marketing boards thus serve as instruments of agricultural taxation.¹⁷ And agricultural pricing policy, it would appear, is made out of primary regard for the securing of government revenues.

Data problems make it extremely difficult to test this interpretation; we simply lack sufficient data to support systematic investigations of the pricing policies of governments. One attempt was made, however, by Bovet and Unnevehr in their study of cocoa exports from Togo.¹⁸ Bovet and Unnevehr note that the net revenues from exports are

$$NR = Q(P_W - P_L)$$

where NR stands for net revenues, Q for the quantity of exports, P_L for the domestic or local price and P_W for world price. A revenue maximizing government would choose a domestic price so as to maximize its net revenue; that is, it would solve the problem

$$\max_{(P_L)} NR = Q(P_W - P_L).$$

Simple calculus yields the first order conditions for this maximization:¹⁹

$$\frac{\partial Q}{\partial P_L} P_W - \frac{\partial Q}{\partial P_L} P_L - Q = 0$$

Multiplying both sides by $\frac{P_L}{Q}$ yields:

$$\left(\frac{\partial Q}{\partial P_L} \cdot \frac{P_L}{Q} \right) P_W - \left(\frac{\partial Q}{\partial P_L} \cdot \frac{P_L}{Q} \right) P_L - P_L = 0$$

Or, simplifying,

$$\frac{P_L}{P_W} = \frac{\eta}{\eta + 1}$$

where η = the price elasticity of production.

Given knowledge of the elasticity of production, then, the government could establish a ratio of the local to world price which would maximize the revenues it earned from the export of the commodity. On the basis of the evidence they collected, Bovet and Unnevehr are convinced that the government of Togo is doing just that. As they conclude,

The elasticity of short-term supply was estimated at .51. Using this elasticity optimal revenue maximizing prices were calculated for 1967-76. The results show that [marketing board pricing] policies have maximized government revenues.²⁰

In fact, the evidence presented by Bovet and Unnevehr shows that the producer prices paid by the Board consistently lay slightly above the revenue maximizing prices predicted by their model. This implies either that the government had other objectives that it was

Table 5

Dependent Variable: Coefficient of Nominal Protection.

Independent Variable	Regression Coefficient	Ratio of Regression Coefficient to Standard Error	Significance Level ⁽¹⁾
Percent Labor Force in Public Services	-0.241	-2.276	.025
Petroleum Deposits	0.346	1.296	.13
Constant	0.904		

Estimated $R^2 = 0.39$

1. One-tailed test, 10 degrees of freedom.

periods when the rate of domestic inflation exceeds the rate of inflation abroad. In either case, the result is the transfer of resources out of export industries, such as agriculture, and into industries with high propensities to import. From the point of view of export agriculture, then, overvaluation represents but another kind of tax.

These arguments suggest that the greater the impetus for industrialization, the higher the level of overvaluation. This impetus could be measured in terms of the ideological commitment to rapid industrialization (as suggested by Young's categorization of the preferences of governments) and by the size of the existing stock of industries (as measured by the percent of the labor force in urban employment). The discussion also suggests the importance of controlling for the rate of inflation as a possible determinant of the level of overvaluation.

As seen in table 6, testing these hypotheses lends moderate support to our analysis. We had expected positive coefficients in cases where governments propounded Marxist-Leninist or socialist ideologies and negative coefficients where they adhered to capitalist ideologies; we also expected positive coefficients for the variables measuring the rate of inflation and the size of industry. In every case but one, the signs of the coefficients confirmed to expectations. Only two of the coefficients are statistically significant at conventional levels of confidence, however. This collection of variables explains 50 percent of the variance in government exchange

Table 6

Dependent Variable: Ratio of Official to Unilateral Exchange Rate.

Independent Variable	Regression Coefficient	Ratio of Regression Coefficient to Standard Error	Significance Level ⁽¹⁾
Government's Ideology			
Marxist-Leninist	3.618	2.122	.05
African socialist	-0.697	-0.528	—
Capitalist	-1.120	-0.754	.17
Percent Labor Force in Urban Areas	0.684	1.272	.13
Inflation	0.117	1.584	.10
Constant	-0.419		

Estimated $R^2 = 0.50$

F = 2.642, not significant.

1. One-tailed test, 13 degrees of freedom.

rate policies.

Conclusion

The purpose of this paper has been to summarize recent interpretations of government behavior toward agriculture in Africa and to assess their credibility. With respect to the marketing of food crops, governments were seen as intervening on behalf of organized urban interests; for cash crops, they were viewed as manipulating prices in order to tax, both so as to collect public revenues and so as to redistribute purchasing power to the consumers of imports. Such interpretations seek to account for the generally draconian nature of agricultural prices. The tests of these interpretations reported in this paper indicate that we may well be on the right track in attempting to explain the behavior of governments toward their agricultural industries but that we will still have far to go.

Notes

1. Theodore W. Schultz, Transforming Traditional Africa (New York: Arno Press, 1976), p. 5.
2. Malcolm D. Bale and Ernst Lutz, "Price Distortions and Their Effects: An International Comparison," World Bank Staff Working Paper No. 359, 1979.
3. Willis L. Peterson, "International Farm Prices and the Social Cost of Cheap Food Prices," American Journal of Agricultural Economics, 61, no. 1(1979):18.
4. Robert H. Bates, Markets and States in Tropical Africa (Berkeley and Los Angeles: University of California Press, 1981) and Essays on the Political Economy of Rural Africa (Cambridge: Cambridge University Press, 1983).
5. Other forms of intervention are discussed in Bates, Markets and States.
6. For estimates of the frequency of these kinds of behavior, see United States Department of Agriculture, Food Policies and Prospects in Sub-Saharan Africa (Washington, D.C.: USDA, 1980).
7. Government of Nigeria, Public Service Review Commission (Udogi Report) (Lagos: Ministry of Information, 1974); Second and Final Report of the Wages and Salaries Review Commission (Lagos: Ministry of Information, 1971); and First Report of the Anti-

Inflation Task Force (Lagos: Ministry of Information, 1975).

8. Nigeria, Second and Final Report, p. 93.
9. Ibid., p. 10.
10. Hiromitsu Kaneda and Bruce F. Johnston, "Urban Food Expenditure Patterns in Tropical Africa," Food Research Institute Studies 2, no. 3(1961):229-75.
11. See, for example, the income elasticities published in USDA, Food Problems and Prospects in Sub-Saharan Africa, p. 48.
12. See, for example, the accounts of the rice riots in Liberia which formed an important prelude of the Tolbert regime in Africa, June 1979.
13. United States Department of Agriculture, Food Policies and Prospects in Sub-Saharan Africa (Washington, D.C.: USDA, 1980).
14. See also Charles Tilly, From Mobilization to Revolution (Reading, Mass.: Addison-Wesley, 1978) and "Food Supply and Public Order in Modern Europe," in The Formation of National States in Europe, ed. Charles Tilly (Princeton: Princeton University Press, 1975).
15. It should be noted that the correlation coefficient between whether a government is Marxist-Leninist, Socialist or Capitalist (see note 16 below) and the percent of the labor force in industry are .03, .12, and -.28 respectively. There is thus no

problem of collinearity in these data.

16. Crawford Young, Ideology and Development in Africa (New Haven and London: Yale University Press, 1982).
17. See P. T. Bauer, West African Trade (London: Routledge and Kegan Paul, 1964) and Robert H. Bates, Markets and States in Tropical Africa: The Political Basis of Agricultural Policies (Berkeley and Los Angeles: University of California Press, 1981).
18. David Bovet and Laurien Unnevehr, "Agricultural Pricing in Togo," World Bank Staff Working Paper No. 467 (1981).
19. On the assumption that the impact of the choice of a domestic price on the quantity of exports does not affect the world price, i.e. that the country is a small producer.
20. Bovet and Unnevehr, p. 10.
21. International Bank for Reconstruction and Development, Accelerated Development in Sub-Saharan Africa (Washington, D.C.: IBRD, 1981), p. 56.
22. Note should be taken of the World Bank's commentary regarding the value of these coefficients: "the actual level of taxation of export crops is higher than shown in two important respects. In the first place, the economic farm gate value of these crops has been derived on the basis of actual marketing costs. These costs are, in most cases, those of monopolistic agencies working

without competitive pressure, and thus are generally inflated.

If the marketing cost of an efficient marketing system were used instead, the economic value of crops would be higher and the degree of implicit taxation even greater. The level of taxation is also higher than shown because the NPCs do not reflect the influence of overvalued currencies, which reduce the proceeds of exports in terms of domestic currency. Taking into account the effect of overvalued currency, producers in a number of countries listed in the table received less than half the real value of their crops in recent years." Ibid, p. 56.

23. Doris J. Jansen, "Agricultural Pricing Policy in Sub-Saharan Africa in the 1970s," December 1980.
24. Franz Pick, Pick's Currency Yearbook, 1976-1977 (New York: Pick Publishing Corporation, 1978).